THE

YOUNG MECHANIC.

MAY, 1833.

CHEMISTRY.

[Continued from page 55.]

NITROGEN.

Azote or Azotic gas, mephitic air, phlogisticated air.

This gas exists abundantly in nature. It enters into the composition of all animal substances, and in all those vegetables that emit an animal odor while putrifying; such as cabbage, mustard, mushrooms, &c. It is found in the waters of Bath and Buxton, and is evolved from several native hot springs. Combined with oxygen it forms the atmosphere, and with oxygen in other proportions and with other bodies it unites, forming important compounds which will be mentioned hereafter. It was discovered by Dr. Ruthford, in 1772. Nitrogen must be considered as a simple body. It has been supposed to be compound. Berzelius calls it *suboxidum nitricum*, the nitricum being a hypothetical element, of which this is supposed to be the protoxide.* Its specific gravity, according to Thomson, air being unity, is 0.9722.

Weight of 100 cubic inches 29.65 grains.

Its combining weight is 14, hydrogen being 1. Its capacity for heat, according to Dr. Crawford, is 7936.

It is attracted to the negative pole in the electro-galvanic circuit, and is therefore considered as electro-positive.

Water which has been freed from air by boiling absorbs about 1 1-2 per cent of this gas.

It is transparent, colorless, tasteless, and without odor. At the usual temperature and pressure of the atmosphere it is perma-

* When any of the salts of ammonia (an alkali which contains nitrogen) are galvanised with mercury an amalgam is formed; from this it has been inferred that the base of nitrogen was a metal.

nently elastic. It refracts light feebly. It is not combustible or a supporter of combustion, and is fatal to animal life. The death of an animal confined in it does not proceed from any noxious quality which it possesses, but from its inability to support life.

There are several processes by which nitrogen may be obtained.

1. If phosphorus be burnt in a confined portion of atmospheric air, it combines with oxygen forming phosphoric acid, and nitrogen remains, combined however, with a portion of carbonic acid, which may be separated by agitating it with a solution of caustic potassa.

2. Lean meat digested in a retort with nitric acid of sp. gr. 1.20 with a gentle heat affords nitrogen by a decomposition of the meat. The fibrous parts of animal matter afford the most nitrogen—gelatinous substances afford the least. The meat should be fresh, otherwise the nitrogen obtained will be contaminated with other gases.

3. Sulphur and iron filings, about equal parts, or sulphur and potash, mixed together, moistened with water, and placed under a bell glass, absorb the oxygen of the atmosphere contained therein in three or four days and nitrogen gas remains. During the action which takes place, the air diminishes in bulk; when this ceases, it should be removed from the iron filings and sulphur, as it would otherwise become contaminated with sulphuretted hydrogen.

4. A solution of sulphate of iron saturated with nitrous gas, agitated with air, combines rapidly with the oxygen, and nitrogen gas remains.

5. If 100 measures common air be mixed with 80 measures nitrous gas in a wide vessel over water, 79 measures of nitrogen gas remain.

Nitrogen, when prepared by any of the foregoing methods, if required pure, should be agitated with lime water, in order to separate the carbonic acid which it contains.

Mr. Faraday's method of detecting minute portions of nitrogen is as follows :—Into a glass tube 4 or 5 inches long, and $\frac{1}{4}$ of an inch in diameter introduce a piece of zinc foil, above it a piece of potash, and about two inches above the potash, a piece of turmoric paper moistened with pure water. The test paper will indicate an alkali, when the potassa is melted by a spirit lamp, and the color will be discharged when the paper is withdrawn.

GEOMETRY AND ARITHMETIC.

[Continued from page 58.]

TRIANGLES.

A triangle is a figure of three sides and as many angles. A method to find the area of a triangle is given at page 25.

Triangles are of different kinds, according to the proportions of their several parts.

Fig. 3.

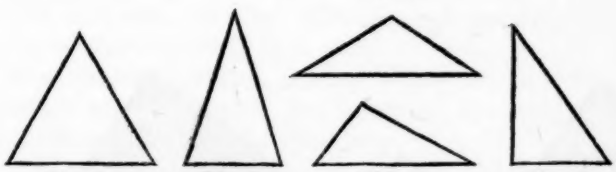


Fig. 1. Fig. 2. Fig. 4. Fig. 5.

An equilateral triangle has all its sides equal, as fig. 1.

An Isosceles triangle has two equal sides, as figs. 2 and 3.

A scalene triangle has all its sides unequal, as fig. 4.

A right-angled triangle is one that has in it a right-angle, as fig. 5.

A triangle cannot have more than one angle as large as a right angle, and the side opposite to the right angle is called the hypothenuse, which is always the longest side.

An obtuse angled triangle has one obtuse angle, as figs. 3 and 4.

An acute angled triangle has all its angles acute, as figs. 1 and 2.

An isosceles, or scalene triangle, may be either right-angled, obtuse, or acute.

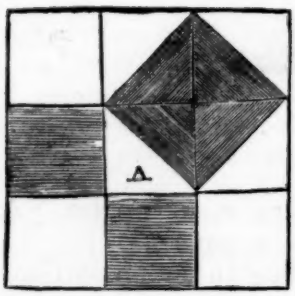
Any side of a triangle is said to subtend the angle opposite to it.

There are many problems on triangles. I shall give two of the most useful.

Problem 1*st.* The sum of the three angles of every triangle, is equal to two right angles, or 180 degrees.

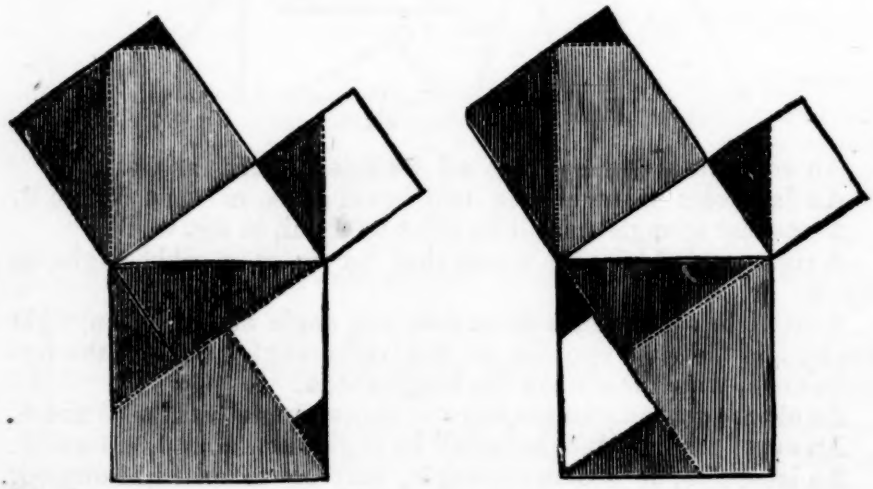
Although this cannot be demonstrated geometrically without a diagram, and a previous knowledge of the properties of parallel lines, yet it can be done mechanically, by forming a triangle of a piece of card, cutting off the angles, and placing them together on one side of a straight line; it will be seen that the three angles occupy all the angular space of half a circle, or two right angles.

Problem 2*d.* The square described upon the hypothenuse of a right-angled triangle, is equivalent to the sum of the squares described upon the other two sides.



In the annexed diagram are 9 squares, all of the same size. The centre square is divided into two equal parts; one of which marked A, is the right-angled triangle; upon the hypothenuse, the large shaded square is described, consisting of 4 half squares, which is equal to the 2 squares, described upon the other two sides.

In the above example, two of the sides of the triangle are equal, but the rule holds good when they are unequal, as may be seen by the following figures.



The different shades of color in these diagrams, show the parts which correspond with each other, and the whole may be proved correct by drawing the figures, and afterwards cutting them into the several pieces marked, and applying them to each other.

APPLICATIONS.

By problem first, we are taught the number of degrees in the three angles of every triangle; of course, if two angles are given, it will be very easy to find the third, or if one angle is given, we can tell how many degrees are contained in the other two.

Problem second, teaches how to find one of the sides of a right-angled triangle when the two others are given. If, for instance, we wished to find the length of the hypothenuse of a right-angled triangle, and the other two sides were known to measure, one 6, the other 8 feet, the sum of their squares 36 (6 times 6) and 64, (8 times 8) equal to 100, would be the area of the square of the hypothenuse; the square root of that number would be 10, the length of the hypothenuse itself. If the hypothenuse and one of the sides are given, you need only subtract the square of the

side from the square of the hypothenuse, and then the square root of the remainder is the other side. If, for instance, the hypothenuse of a right-angled triangle were 5 feet, and one of the sides 3 feet, the square of the hypothenuse would be 5 times 5, or 25, and the square of 3, which is 9, subtracted from 25, leaves 16, which would be the square of the side to be found; and taking the square root of it, which is 4, (because 4 times 4 are 16) you will have the side itself.

This is called the Carpenters' Theorem, or the 6, 8, and 10 rule; because these numbers are in proper proportion, and if they represent feet, they are of convenient length in squaring large frames; for if you make a mark at 6 feet from the corner of a square on one side, and another at 8 feet on the other side, these marks will be 10 feet apart if the work is square. By this rule, the length of a ladder, a shore, or stay of any kind, that will reach a certain height may be found, by knowing the height, and how far the foot is to stand from the building.

For the discovery of this principle, we are indebted to Pythagoras, a famous Greek mathematician. It is a very important one, and a method of proving it geometrically, was long a desideratum with the ancients. The Philosopher was so overjoyed on making this discovery, that he is said to have sacrificed a hundred oxen.

PHILO.

DIVIDING PLATE FOR A LATHE.

I have found a dividing plate on the pulley of a lathe, a very useful appendage. To divide one accurately is rather a difficult task. Having, after several fruitless attempts, hit upon a plan which I consider very practicable, and at the same time accurate, if done with care, I have thought it of sufficient importance to lay before your readers.

Having prepared a plate of brass the size of the pulley, namely 8 1-2 inches external diameter, 2 inches wide, 4 1-2 inches internal diameter, 1-8th of an inch thick, with a projecting circular rib at the back of the plate to strengthen it, this is fastened on a cast iron pulley with small brass rivets. It requires great care to make a wood pulley that will remain true.

Sometimes the holes in the concentric circles are drilled on the plain face of the brass plate; others have slight grooves turned where the holes are to be. I turned 11 grooves in my plate; and after dividing them and finding several intermediate numbers wanting, I drilled 10 other circles on the plain face between the grooves, so that I have 21 circles divided in the space of 2 inches in breadth, and are much less confused than they would have been had they been all in grooves, or all on the plain face. The method of dividing is as follows:—Prepare a punch with several oints, (the one I used had 7 points, 1-12th of an inch apart,) cut

by holding it against a steel screw running in the lathe, the same way that screw tools or chasers are made; after rounding these points with a file, the punch must be tempered; then prepare a piece of sheet brass long enough to receive as many holes as you want in the largest circle; it may be from half an inch to 1 inch wide, and about 1-32nd of an inch thick; it should be straight and smooth; draw a line in the middle of the plate, from end to end; then with your punch commence at one end; strike the blow in such a manner that the first point may make the deepest impression; then shift the punch one hole only, pressing the punch firmly into the six impressions made by the first blow; proceed in this way one hole at a time, and you will not be able to detect any error with the compasses. The holes may be finished with a small drill. The next step is to form this plate into a ring, and join the ends; this may be done by cutting a notch at one end of the plate 1-4th of an inch wide and half an inch long, leaving a narrow strip on each side, with two holes in each strip for rivets; these strips should be set outwards the thickness of the plate, to allow both ends to butt together, and the ring to be smooth inside; the end of the plate between the two strips should be filed so as to leave half a hole; the tenth hole from that should be marked; proceed in this way, marking every tenth hole, to the end; count off as many holes as you want, reckoning the two half holes at the ends as one. In cutting off the end it is best to leave rather more than half a hole, and when the ends are brought together, the hole may be adjusted by filing. If a darning needle will fit this hole, as well as any other, there cannot be much mistake; the ends may be held by a hand vice until some of the rivets are put in.

Having obtained a circle divided accurately, the next step is to tranfer it to the dividing plate, which we will suppose already on the lathe pulley; let an arbor, one foot long and half an inch square, be put into the lathe ; if the mandril has a square hole, so much the better; if not, a chuck with a square hole, screwed on tight, will do, as the arbor must not be allowed any side movement; on the end of the arbor, next the sliding head, a piece of seasoned wood must be put on secure, and turned to receive the ring, this may be kept from shifting by two or three small tacks; from the lathe-bed a piece of steel, rather springy, should extend up as high as the centre of the lathe, terminating in a point bent at a right angle so as to fall into the holes in the ring, and hold it fast while the dividing plate is being drilled; the drilling apparatus consists of a small drill with its arbor all of one piece of steel, (for if the drill gets lose it makes bad work,) on the arbor is a small pulley which is worked with a cane drill-bow in the left hand, the drill is put into a small frame which fits into the hole in the rest, and may be moved sideways, or up and down at pleasure, the drill is urged forward by a screw with the right hand and thrown back

by a spiral spring on the arbor between the pulley and frame next the drill. A radius line should be drawn across the dividing plate, so that the first hole of every circle may coincide. After the first circle is finished the ring must be unrivetted and as many holes cut off as will reduce it to the next number wanted. It will sometimes be better to finish some of the smaller circles before the ring is much reduced; this may be done by skipping one or more holes.

The following are the numbers on my dividing plate; those with this * mark are in the grooves, the others on the plain face.

Cir.	No.	Subdivisions.
1	24*	12, 8, 6, × 4, 3, 2.
2	73.	
3	365*	73, × 5.
4	36,	18, 12, 9, 6, × 6, 4, 3, 2.
5	360*	180, 120, 90, 72, 60, 45, 40, 36, 30, 24, 20, × 18, 15, 12, 10, 9, 8, 6, 5, 4, 3, 2.
6	30,	15, 10, 6, × 5, 3, 2.
7	300*	150, 100, 75, 60, 50, 30, 25, 20, × 15, 12, 10, 6, 5, 4, 3, 2.
8	86,	43, × 2.
9	276*	138, 92, 69, 46, 23, × 12, 6, 4, 3, 2.
10	82,	41, × 2.
11	132,	66, 44, 33, 22 12, × 11, 6, 4, 3, 2.
12	74,	37, × 2.
13	96*	48, 32, 24, 16, 12, × 8, 6, 4, 3, 2.
14	70,	35, 14, 10, × 7, 5, 2.
15	84*	42, 28, 21, 14, 12, × 7, 6, 4, 3, 2.
16	62,	31, × 2.
17	78*	39, 26, 13, × 6, 3, 2.
18	58,	29, × 2.
19	76*	38, 19, × 4, 2.
20	54,	27, 18, 9, × 6, 3, 2.
21	68*	34, 17, × 4, 2.

A list of numbers that may be obtained from this plate showing in which circle they occur.

No.	Circles.	No.	Cir.
2	1	40	5
3	1	41	10
4	1	42	15
5	3,5 6,7	43	8
6	1,4,5,6,7	44	11
7	14,15	45	5
8	1,5,13	46	9
9	4,5,20	48	13
10	5,6,7,14	50	7
11	11	54	20
12	1,4,5,7	58	18
13	17	60	5,7
14	14,15	62	16
15	5,6,7	66	11
16	13	68	21
17	21	69	9
18	4,5,20	70	14
19	19	72	5
20	5,7	73	2,3
21	15	74	12
22	11	75	7
23	9	76	19
24	1,5,13	78	17
25	7.	82	10
26	17	84	15
27	20	86	8
28	15	90	5
29	18	92	9
30	5,6,7	96	13
31	16	100	7
32	13	120	5
33	11	132	11
34	21	138	9
35	14	150	7
36	4,5	180	5
37	12	276	9
38	19	300	7
39	17	360	5
		365	3

Boston Mechanics' Magazine.

For the Young Mechanic.

ARCHITECTURE—N°. III.

HAVING briefly noticed in the two preceding essays, the early origin of building, and the improved state of the art as it may be gathered from the early part of Moses' history, it will be proper, before describing the peculiarities of style and workmanship of those ancient nations which have been distinguished for their architectural works, to enumerate some of the essential parts which constitute a building.

The first and most important part, is the foundation. If this be not deep and firm enough to withstand the operations of the weather, and to be secure against common accidents, the superstructure, however costly its materials, or beautiful its design, can be of little value as an edifice, for ornament or for use.

The column is a vertical part of a building, and supports that part of the edifice which is above it.

The wall is generally considered as the lateral continuation of the column, and is intended both for enclosure and for support.

The lintel is a horizontal member of a building, and is placed over an opening in the wall, or extends from the top of one column to the top of another.

The arch is a transverse member of a building, answering the same purpose as the lintel, but vastly exceeding it in strength. The peculiar properties will be noticed hereafter. Abutments are those members of a building on which arches are built, and which sustain all the pressure that is made to bear upon them.

An arcade is a continuation of arches. A vault is the lateral continuation of one arch serving to cover an area or passage, and bearing the same relation to the arch that the wall does to the column.

A roof is the covering to the building. A dome or cupola is a concave covering.

These constitute the essential elementary parts of a building: and the particular forms, arrangements, proportions and ornaments which are given to these, make different styles and orders of architecture.

D. B. H.

PATENTS FOR MASSACHUSETTS.

Granted in August and September, 1832.

From the Journal of the Franklin Institute.

For a *Machine for Hulling, Cleaning, and Polishing Barley Rice, Broom Corn, &c.;* Theodore F. Strong, and Marcus T. Moody, Northampton, Hampshire county, Massachusetts, August 29.

Two disks are to be made in the form of mill stones, and are to operate in the same way; the upper one is to be of cast iron, to give it weight, but it is to be faced on the lower side with wood. The lower is to be of wood entirely. These disks are to be faced with strong card teeth, set in leather, or other elastic substance, and the grain to be hulled, &c. is supplied as to ordinary mill stones. From between these it passes into a winnowing machine, where the chaff and dirt are blown off, and the clean grain is conducted by a trough through the eye of the upper of another pair of disks similar to the former, but faced with finer materials, as with bristles, hair, or dogfish skin; after which it passes into a second winnowing machine, which completes the operation.

For an improvement in the mode of *Preparing Fomentations used in cases of Sickness;* Timothy L. Jennison, Cambridge, Middlesex county, Massachusetts, August 30.

The main apparatus, or implement to be employed, the patentee denominates a *foveat*, which is to be substituted for the woolen, or other cloths, generally used in fomenting with decoctions of aromatic herbs, or other articles. The foveat is to be made of silk, cotton, linen, or other suitable cloth, and may be about half a yard square. Two pieces may first have lambs-wool batting quilted in between them; a similar piece laid upon this is then to be run, or stitched to it in the manner of the old fashioned housewife, leaving parallel spaces which would admit a round stick of an inch in diameter. The stitching is to be done in double rows, leaving a space of a third of an inch between each of the larger cavities. These large cavities are to be stuffed with the aromatic herbs, &c. by means of a funnel and rod, prepared for the purpose. When thus prepared it is to be dipped into boiling water, and then placed between two boards, which are hinged together at one edge, and is called a compressor ; between these it is to be squeezed sufficiently dry, and then applied to its intended purpose. The whole apparatus is claimed as new.

The specification contains remarks upon the mode pursued 'during the past century,' and upon the great superiority of this apparatus and procedure, with particular directions for its use, which we do not think it necessary to copy. We do not dispute the goodness of the contrivance, but its employment will be principally confined to hospitals, and other institutions of a similar character, from which we do not expect, and scarcely wish, that the patentee should realise a fortune. Such establishments as these give freely, and should freely receive.

For an improvement in the mode of *Sizing paper by Machinery;* John Ames, Springfield, Hampden county, Massachusetts, Sept. 1.

For a *Pulp Dresser*, for dressing pulp in the manufacture of paper; John Ames, Springfield, Hampden county, Massachusetts, September 1.

THE MECHANICAL ARTS.

Next to Agriculture, in point of necessity and usefulness, should be regarded the arts of mechanism. Who is more deservedly entitled to our respect and a rich pecuniary reward, than he who can so control the properties of motion, and calculate velocities, as at once almost to annihilate time and space? than he who is enabled, by the force of the elements themselves, to convert all, that is within reach in nature, to the most advantageous purposes—either to assist man in his enterprises, by supplying his weakness, or to satisfy his wants, or contribute to his convenience?

While our country abounds in the variety of materials necessary to be wrought by the ingenious mechanic into labor-saving machines, and while this supply of materials affords him, of ever so humble means, the required facilities of accomplishing the most surprising works within the compass of human agency, it offers, also, a stimulus to the capitalist to encourage the highest degree of perfection in machinery, for the economy of labor, of which the modifications of the mechanic powers are susceptible.

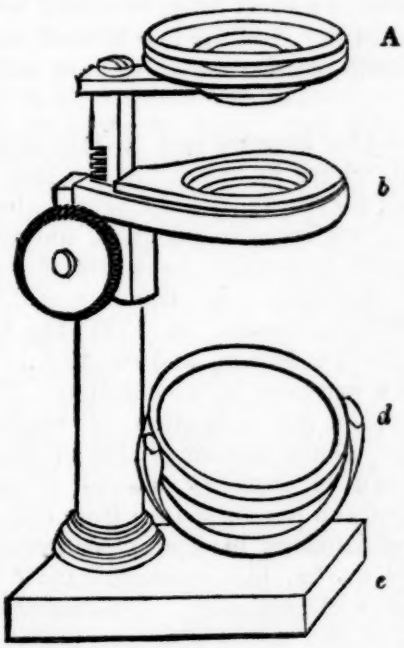
The vast extent of our territory; its cheap and luxuriant soil, inviting by the salubrity and variety of its climate, to all who may choose the honorable calling of husbandry, with a sure promise of a rich reward, renders nugatory the objections of some, that human labor will be out of demand. In this government, at least, while the best of wild lands, at a nominal price, are accessible to all, industrious and ingenious mechanics will never go unrewarded because machinery is too plenty.—And no other country offers the same reciprocal assurance of success in the cardinal pursuits of human industry; the field of our agriculture has no known limits; our commerce, resting on the industry and enterprise of a republican people, looks boldly to countries the most remote; while the motto over the entrance of our manufactories is 'Onward.' Already may it be truly said of the American Mechanist, as it was by the Grecian—Give him but a fulcrum and he will move the world.

With the ardent mechanist, a thorough knowledge of mechanical laws, and a power of referring effects to causes, and vice versa, which always depend upon, and lend to each other, reciprocal aid, is the basis of improvement and discoveries; and a judidious adaptation of materials, and a scientific combination of forces, constitute the perfection of his art.—*Syracuse Argus.*

A NEW POCKET MICROSCOPE.

In a work lately published in London, called the 'Microscopic Cabinet,' is a description of a new Pocket Microscope, invented by Mr. Pritchard, which we copy from the London Mechanics' Magazine.

Portability is a quality so essential in the opinion of many persons that I have been induced to construct a small instrument for their use, which at the same time should be more consistent in its principles than those in common use, and I believe will be found much more simple and equally useful. In similar instruments before the public, to render them portable, they separate into two or more pieces; this is obviated in my construction by the bar running within a tubular stem. Another objection to the common ones is, that in using high powers the illumination is more feeble than with low powers; but it must be evident that the reverse ought to be obtained, for the more we amplify an object the darker it becomes. In their construction they remove the object further from the light, the higher the magnifying power; in mine the magnifier is brought to the light, the object being stationary. The bar is triangular, and therefore less liable to shake and loosen than square ones. A rough sketch of the microscope with the triangular bar partly drawn out to show the rack is here given.



A are two magnifiers, of which there are four; they fit by a spring into the arm at the top of the bar. These magnifiers are adjusted to the object placed on the stage *b* by the milled head *c* of the pinion, and the light is directed through it by the mirror *d*,

which can be turned about in any direction, and fits into the stand or block *e*. When the bar is lowered and the magnifiers taken out of the arm, the instrument, which is now only two inches and a quarter long, fits into a case (about the size of a snuff-box) one inch and three quarters wide by one inch deep (inside measure); the four magnifiers, packing between the stage and mirrors, do not occupy any extra space.

Miscellany.

The Patent Baker Case.—This was an action for damages brought by I. Dobson, of Connecticut, against Campbell & Mills of Bangor, for making and vending Double Reflecting Bakers, for which said Dobson had a patent right. It occupied about a day and a half before the U. S. Circuit Court in this place last week, and excited a good deal of interest. The case was managed on the part of the plaintiff by Messrs. Greenleaf, Fessenden and Deblois, and for the defendant by Mr. Sprague.

The arguments of the counsel were able and ingenious, and the charge of Judge Story, as usual, learned and interesting.—The jury after being absent a short time, returned with a verdict of 120 dollars for the plaintiff. And the law in such cases allowing triple damages, the plaintiff recovers 360 dollars and costs.—*Portland Courier, May* 7.

Jacob Perkins.—Our countryman is still engaged in his useful labors in England, where he has spent the last fifteen years of his life, exalting, in all his works, the American character for science. Mr. Perkins was a self-taught artist, a native of Newburyport, was originally placed apprentice to a watch maker, and was the first die-sinker in America. At the age of 17, he struck for the Government of Massachusetts, in 1787, the CENT of that State, bearing on one side the *Indian*, and on the reverse, the *Eagle*, thousands of which are now in circulation. The pump box, the nail cutting machine, the invention of engraving on steel, the bank lock, and the steam cannon, fruits of his original mind, will hand his name down to posterity, as one of whom we may justly be proud. Previous to his departure from this country, we passed a day at his establishment in his native town, and was delighted with his extensive works, his communicative disposition, and his admirable simplicity of character. The latter trait was so remarkable, that a child of ten years who sought for scientific information, might ask it of him fearlessly, and be abundantly gratified. We are led to these remarks by observing in a late number of the London Atheneum, the following article, which is the only notice of him that we have seen for a long time:—

Perkins's Steam Generator.—In one of our former numbers, we noticed Mr. Perkins's newly discovered system of generating steam, by means of a lining placed within the boiler, thus effecting a continuous circulation of the heated water; the advantages anticipated, were the generating steam with increased rapidity; the preservation of the boiler, and the saving of fuel. In proof of the great probability that the result will fully answer expectations, we are enabled to state, that during the last fourteen weeks, in which period, Mr. Perkins has been engaged in the application of his principle on the Liverpool and Manchester rail-road, one of the locomotive engines employed thereon, having his lining or circulator introduced into its boiler, enduring 360 successive journeys, to and fro, between Liverpool and Manchester, run upwards of 20,000 miles without the slightest appearance of wear and tear, the tubes of the boiler, at the end of the journey, being as free from corrosion as at the first moment of their use, and with a saving of fuel to the extent of 40 tons, when contrasted with the ascertained consumption of another locomotive engine, drawing equal weight. These important results must prove of vital consequence to the great question of railway conveyance, which so much occupies the attention of the public at the present time.—*Boston Eve. Gazette.*

Sculpture in Ivory.—Magnus-Berge, one of the most skilful workers in ivory, perfectly understood the art of preserving it. He placed under glass, in beautiful frames, all his works, which, for the most part, were in relief. The numerous master-pieces of this artist which may be seen in the cabinet at Copenhagen, are, from this provision, as white as snow, and it is difficult to believe that they are really ivory; artists then, and those who form collections of this description, will do well to place them constantly under glasses. Cabinets with glass doors are not sufficient to preserve works in ivory, for it is difficult to discover where dust will not penetrate. By placing the sculpture under bell glasses, it derives the double advantage of being preserved from turning yellow, and of being rendered more white than in the first instance, whatever besides may be the disposition to become discolored. Dust is exceedingly injurious to ivory; it fixes itself in the pores, tarnishes its brilliancy, and renders its surface uneven, and is removed with hazard, on account of the fineness of the grain and the lightness of the work.—With respect to antique works in ivory that have become discolored, this disfiguration may be removed, and they may be brought to a pure whiteness by exposing them to the sun under glasses. Antique works in ivory that have become discolored may be brushed with pumice stone calcined and diluted, and while yet wet, placed under glasses. They should be daily exposed to the action of the sun, and be turned from time to time, that they may become equally bleached. The bleaching may be accelerated by frequently repeating the operation just described.—*Repertory of Patent Inventions.*

Dry Dock.—We have received from a friend, in reply to some inquiries, a few particulars concerning the U. S. Dry Dock, recently constructed at the Navy Yard, Charlestown, Mass. The Dock, we learn, is 341 feet in length, by 80 in width, and 30 feet deep. It is capable of admitting the largest ship in our navy—viz. the Pennsylvania, the entrance of the dock being 60 feet across, and the width of that ship being 55 feet. The dock is furnished with two setts of gates called turning gates, weighing 50 tons each. Besides these, there is what is denominated the floating gate, which weighs 300 tons; built like a vessel, is 60 feet long, 15 wide, and 30 in height—requiring about 19 feet of water to float it. This is set in a groove outside of the other gates, filled with pig iron, and sunk.

For emptying the dock of water, a powerful hydraulic apparatus is employed, wrought by a steam-engine of 60 horse power. There are 8 lift pumps, each 2 feet 6 inches in diameter, and discharging altogether, at every stroke, 12 hogsheads; there are also 8 chain pumps, 1 foot in diameter. The water is first forced from the dock into wells, then into a large reservoir, whence it runs into the sea. The weight of the steam engine and machinery is about 122 tons.

The floating gate is said to contain timber enough to build a ship of 300 or 400 tons; and some 3 or 4,000 dollars' worth of sheathing and bolt copper have already been used upon it. The turning gates, at high water, sustain a pressure equal to about 800 tons.—*Nantucket Inquirer.*

India Rubber.—This valuable product, first made known by La Condamine, in 1736, is the juice of several species of trees growing in South America. It flows from the trees as a milky fluid, which soon hardens upon exposure to the air. Various attempts have been made to transport it to Europe in its fluid state, but without success. Its application to the arts is various, but, until recently, no advantage has been taken of one of its most remarkable properties, its elasticity. Two ingenious chemists of Paris, Messrs. Ratteir and Guibal, by an entirely new solvent and a very delicate process, have succeeded *in spinning it into threads of various sizes*. This is subsequently woven into suspenders, garters, surgical bandages for ruptures, fractured or dislocated limbs, &c.

Improved Saw.—Mr. Stephen Ustick, of Philadelphia, has recently obtained letters patent, for a saw of his invention. It consists of a pair of knives or side cutters, which project a very short distance below the points of the common teeth in the saw, so that the saw is moved to and fro, either through a log or across it. The knives or cutters penetrate the wood with great facility, and are followed immediately by the common teeth, which rip out the wood left between the knives with a degree of despatch, which is truly surprising; one man will cut off a log with greater ease, than two men could with a common saw.—*Phil. paper.*

Polar Table.—Capt. David Leslie, of New York, has prepared a polar table, by means of which, and the altitude of a polar star, taken at any hour of the night, the latitude may be found in a very simple manner. It is said this will be a valuable acquisition to the navigator, and will be published immediately.—*N. Y. Jour. Commerce.*

Chronometers.—For the purpose of encouraging and improving the manufacture of these useful instruments, the British Government offer annually £500 in premiums for such as shall be found to perform best during a twelve month's trial at the Royal Observatory. From an inspection of the monthly reports, issued from that institution, during the trial recently closed, we find that out of the number sent in (sixty-two) the best was declared to be that by Messrs. Molyneux & Sons, No. 1038, which took the first premium—having performed with an accuracy almost incredible—its actual variation from its rate in 12 months being only *sixty-seven hundredths of a second.*

Science.—The following practical illustration of science in the common occurrences of life, is from the Genesee Farmer. 'A penknife, by accident, dropped into a well 20 feet deep. A sunbeam from a Mirror, was directed to the bottom, which rendered the knife visible; and a magnet fastened to a pole, brought it up.'

Sympathy of Motion.—It has been found, that, in a watchmaker's shop, the time pieces or clocks, connected with the same wall or shelf, have such systematic effect in keeping time, that they stop those which beat in irregular time; and if they are at rest, set a going those which beat accurately.—*Gardiner's Music of Nature.*

The *Axe Factory* of Collins & Co. at Collinsville, Conn. is the most complete and extensive establishment of the kind, in the U. States. They finish from the bar 700 axes per day. This unparalleled rapidity is by means of an ingeniously constructed machine, with which the head and eye of the axe is formed, and after a few strokes of the hammer, is ready to receive the steel, all which is performed in a few seconds.

Natural Curiosity.—Two of the greatest curiosities in the world are yet scarcely known to geographers and naturalists. The Tuccoa Falls, South Carolina, are much higher than the Falls of Niagara. The column of water is propelled beautifully over a perpendicular rock, and when the stream is full, it passes over without being broken, and with all the prismatic effect seen at the Niagara. The Table mountain in Pendleton district, S. C. is a precipice of 900 feet. It is now occasionally visited by curious travellers, and sometimes by men of science.

MECHANICS' EXCHANGE AND READING ROOM.

This establishment which is got up by Mr. Henry Briggs, for a place of general resort for the Mechanics of this city, is just opened for the admission of subscribers. Its advantages to mechanics, are two fold. While it affords the very best accommodations for the transaction of ordinary business, it also furnishes them with all the news, and most of the periodical literature and science of the day. On the Mechanics of this city, depends the success and permanency of this establishment, and permit me to express the desire, that this class of the community may feel sufficient interest in its continuance and prosperity, to induce them to lend their aid in its support. A SUBSCRIBER.

ANSWERS.

Messrs. Editors,—I noticed in your last number of the Young Mechanic, the following Questions, viz. 'What occasions the singing (as it is called) of a tea kettle before boiling.' 2d. 'What produces the rumbling noise we hear, when hot iron is plunged into water; or steam let into a cold vessel?' The first, I think, is owing to the production of a small portion of vapor at the heated surface, which rises and is condensed by the cooler atmosphere above; by this condensation, a vacuum is formed, and the water pressing into it, produces the sound. The second, I think, may be attributed to the same cause; as the heated iron is plunged into the water, that which comes in contact with it, is converted into steam, which is condensed by the cold water surrounding it; and a vacuum is formed which the cold water rushes in to fill. This process going on rapidly, produces a louder sound. B D.

QUESTION.

Why does rotten wood give light in the dark?